
IN RE: NON-BINDING ARBITRATION PURSUANT TO THE
FINAL SETTLEMENT STIPULATION, KANSAS V. NEBRASKA AND
COLORADO

No. 126 Original, U.S. Supreme Court

DEPOSITION OF WILLEM SHCREUDER

Monday, March 2, 2009
9:01 a.m.

PURSUANT Agreement and the Federal Rules of Civil
Procedure, the above-mentioned deposition was taken
by the State of Nebraska at 1525 Sherman Street, 3rd
Floor, Denver, Colorado before Carol Patterson,
Professional Merit Reporter and Notary Public.

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I N D E X

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(Attached to original transcript.)

1 P R O C E E D I N G S

2 WILLEM SCHREUDER,

3 having been first duly sworn, was examined and
4 testified as follows:

5 EXAMINATION

6 BY MR. BLANKENAU:

7 Q Dr. Schreuder, just a little aside
8 before we get into the heart of the deposition, Pete
9 and I were talking last week and he mentioned that
10 you have a triple Ph.D. and were a professor and we
11 speculated whether you would need to be referred to
12 as Professor Dr. Cubed.

13 A I only have two Ph.D.s, not three.

14 Q Oh, okay. So you are Dr. Squared.

15 You have been deposed before, have you
16 not?

17 A I have.

18 Q And in this deposition, as in those, if
19 you don't understand a question, please tell me that
20 you don't or ask me to rephrase.

21 A Very well.

22 Q Thank you.

23 Can you explain first your familiarity
24 with the Republican River Compact itself?

25 A In the course of the construction of the

1 groundwater model, we reviewed the compact as sort of
2 the basis document from which all of the other
3 agreements arise, but I don't necessarily would put
4 myself out as an expert in the compact, per se.

5 Q Okay. Do you know how the original
6 virgin water supply in the compact was determined?

7 A In a general sense, yes.

8 Q Could you explain that, your
9 understanding.

10 A It was based on whatever the use of
11 groundwater at the time -- correction, the use of the
12 virgin water -- or the -- how the water was divided
13 between the states at the time.

14 Q And then are you familiar with how the
15 allocations were made at that time?

16 A Not in any detail, no.

17 Q With respect to Colorado's allocation
18 within the compact itself, would you agree that the
19 total Colorado allocation is the sum of all of the
20 sub-basin allocations?

21 A I think so.

22 Q Let me then shift to more of your
23 contemporary participation with the impact.

24 Can you explain your history with the
25 compact accounting.

1 A Largely, my participation was in
2 computing the groundwater component of the inputs
3 that becomes the compact accounting.

4 Q Are you familiar with the overall
5 compact accounting procedures?

6 A In a general sense, yes.

7 Q When you say "in a general sense," could
8 you --

9 A I have reviewed the spreadsheets. I
10 don't, as a matter of course, operate those
11 spreadsheets.

12 Q So your involvement is just related
13 strictly to the groundwater model itself?

14 A For the most part, yes.

15 Q And what is your understanding of the
16 purpose of the groundwater model?

17 A I would say that it is used to quantify
18 the impacts of wells on the streams.

19 Q Does that model produce an output result
20 that can be verified to prove that it accurately
21 calculates the impact of stream flows?

22 A Could you ask that question again?

23 Q Sure.

24 Does the model produce an output that
25 can be verified to demonstrate that it accurately

1 calculates the impacts of stream flow?

2 A The model, during the construction of
3 the model, was calibrated to baseflows. So that was
4 a very long question, but I think the answer is yes,
5 because the model was calibrated to historical
6 baseflows and that served as a demonstration that the
7 model can reproduce baseflows.

8 Q So the proof would essentially be just
9 the calibration when the model was adopted?

10 A Yes.

11 Q Can you explain to me the process of
12 calibration?

13 A In the generic sense or specifically as
14 it was applied?

15 Q In the gen- -- let's start with generic
16 first, I may need that.

17 A In the generic sense, the way that a
18 model is calibrated is that you select observations
19 that are generally referred to as targets. And you
20 operate the model and demonstrate -- or adjust the
21 parameters until you can demonstrate that the model
22 can, to a reasonable degree of accuracy, reproduce
23 those observations.

24 Q And specifically, with regard to this
25 model, what was the calibration period?

1 A The model was calibrated by performing a
2 steady-state simulation, to generate initial
3 conditions, and then in a transient sense, from 1918
4 until 2000, and compare to observations which
5 generally spans the period for water levels from
6 about 1918 to 2000 and for stream flows from
7 approximately 1940 to 2000.

8 Q So that would have covered a period when
9 there was very little groundwater development in this
10 basin; is that correct?

11 A Yes. Prior to 1940, there was very
12 little groundwater development in this basin.

13 Q When development of groundwater began in
14 this basin, did it occur in any geographic specific
15 areas or in any specific times?

16 A Could --

17 Q Sure.

18 As groundwater wells developed in this
19 basin, were they concentrated in any particular area?

20 A There is certainly a great deal of
21 variability in the density of where wells were
22 developed, so I'm struggling a little bit with the
23 way that you phrased "the area." There are certain
24 areas where there was a lot more well development
25 than in others. I'm not sure what you --

1 Q I think that answers it.

2 When those wells were developed, when
3 did most of that development occur?

4 A Well, it varied spatially, but a lot of
5 it occurred in the late '50s, '60s and '70s.

6 Q Did it occur generally at the same time
7 for all three states?

8 A Sort of in a very generic sense, yes;
9 but there was, like for example, in Nebraska well
10 development continued well beyond, for example, when
11 well development stopped in Colorado, just as an
12 example. So, yes and no.

13 Q Okay. Let's go back to the calibration
14 a little bit.

15 Specifically, then, how was the
16 calibration done for those years prior to well
17 development?

18 A There really weren't very many targets
19 for that period, so the way that the calibration was
20 performed is to look at the transient response of the
21 model in primarily the period from, you know, the
22 late '50s, onwards. And based on the stream flows
23 and water level behavior in that latter period,
24 parameters such as, for example, during the
25 steady-state, the 75 percent reduction factor was

1 arrived at.

2 Q 75 percent reduction factor?

3 A That applies to the steady-state.

4 Q How did the calibration then change,
5 once wells began to be developed in the states?

6 A I'm not sure what you mean by, how did
7 it change.

8 Q Did it change?

9 A The parameters that were adjusted apply
10 -- are things like hydraulic conductivities that
11 applies to the entire period. So there isn't a
12 different hydrology conductivity for the latter
13 period versus the earlier period, for example.

14 Q I assume that you had more data with
15 which to calibrate to in the later period?

16 A Yes.

17 Q As development occurred in the basin,
18 did Colorado develop prior to Nebraska and Kansas?

19 A The rates of growth in the states are
20 different, at different times. I don't recall to
21 what extent Colorado's reached higher percentages of
22 present-day development than did Nebraska and
23 Colorado -- and Kansas.

24 Q Can you tell us the relative rates of
25 growth in each of the three states.

1 A It has been a while since I looked at
2 that, I don't recall. There was a graph somewhere
3 that -- that showed that, but I don't recall
4 quantitatively what that is at this time.

5 Q As the model functions today, does it
6 accurately determine the reduction in baseflow caused
7 by wells?

8 A Boy, "accurately" is a really loaded
9 word.

10 Q You tell me what you think accurately
11 means before you answer the question. How about
12 that?

13 A I think that the model has been
14 demonstrated to be a reasonable approximation of the
15 historically observed reduction in baseflows.

16 Q "A reasonable approximation," that is
17 kind of a loaded phrase which, in my mind, applies
18 some margin of error; would that be correct?

19 A Yes.

20 Q Do you have any sense for what the
21 margin of error would be?

22 A It's probably not the same on all -- at
23 all of the locations at which it predicts baseflow;
24 but I don't have, off the top of my head, a
25 quantitative description of exactly what that is.

1 Q Do you have a sense for which locations
2 are more accurate than others?

3 A In a general sense, yes.

4 Q Which locations within the model are
5 most accurate?

6 A You would have to review the calibration
7 hydrographs, and those would indicate the relative
8 ability of the model to reproduce the changes in the
9 baseflows.

10 Q But you don't know, today, which areas
11 are most accurate?

12 A Without having them in front of me, it
13 would be hard for me to enumerate exactly which ones.

14 Q Okay. Does the model predict more
15 accurately for certain states than the other two --
16 or a certain state than the other two?

17 A I -- I don't think so, no.

18 Q Okay.

19 Is the Republican River Compact
20 Administration, the engineering committee, or State
21 of Colorado doing anything to improve the accuracy --
22 the predictive accuracy of the model?

23 MR. AMPE: Object to the form as it's
24 rather complex. You are asking three different
25 questions there, but you can answer if you can.

1 Q (BY MR. BLANKENAU) If you understand
2 the question, you can. If you don't, that's fine.

3 A You are asking at this time or you are
4 asking --

5 Q At this time, correct. If you would
6 like, I can break down the question a little bit.

7 A If you could.

8 Q At this time is the Republican River
9 Compact Administration undertaking any program or
10 action to improve the accuracy of the model?

11 A I don't know of any pending action
12 before the RRCA specifically geared at improving the
13 accuracy of the model.

14 Q Is the State of Colorado engaging you to
15 conduct -- strike that.

16 Is the State of Colorado having you
17 undertake any work that would help improve the
18 predictive accuracy of the model?

19 A As part of the ongoing review and
20 application of the model, I have looked at specific
21 factors in the application of the model that could
22 potentially lead to more accurate predictions.

23 Q What have you looked at?

24 A I'm not sure that I could enumerate all
25 of them, but one example would be the refinement of

1 the saturated thickness distribution in the model for
2 predictive applications extending beyond -- well
3 beyond the current timeframe.

4 Q Would using data collected after 2000 to
5 continue the calibration process improve the accuracy
6 of the model?

7 A Could you just ask that question again,
8 please.

9 Q Sure. I will rephrase it a little.

10 As I understood your testimony earlier,
11 the calibration of the model ended with 2000 data; is
12 that correct?

13 A That is correct.

14 Q Would not the accuracy of the model be
15 improved if calibration were a continuing process
16 that utilized data post-2000?

17 A I suspect that it's under the
18 prerogative of the RRCA if they were to decide to
19 perform a recalibration of the model, that that is
20 something that could be done, using more recent data.

21 This specific activity that I was
22 describing, though, is not a recalibration effort.

23 Q But would doing a recalibration effort
24 improve the accuracy?

25 A As an academic exercise, that is

1 certainly a possibility, but not necessarily.

2 Q Why wouldn't it be true?

3 A It may well be that the model is -- the
4 model parameters are as good as you are going to get
5 them.

6 Q You indicated that some areas -- strike
7 that.

8 You have indicated that the model
9 accurately predicts baseflow depletions in some areas
10 better than in others. Did I understand that
11 correctly?

12 A Yeah. I probably used different words
13 and different qualifiers, but, as a general matter,
14 the accuracy would be different in certain locations
15 than they are in others.

16 Q Why would it be more accurate in some
17 locations than in others?

18 A To some extent, it's simply a lack of
19 data in some areas that gives less certainty in
20 certain areas than in others.

21 Q Are you familiar with how the model
22 output data is used within the accounting process?

23 A As a general matter, yes.

24 Q Could you describe that for me, please.

25 A In the accounting spreadsheet there is a

1 tab where the model outputs are incorporated. That
2 tab represents, on a sub-basin basis, the impact
3 predicted on the streams from well pumping on a
4 state-by-state basis, as well as an estimate of the
5 impact of the lower water supply and those terms are
6 then propagated throughout the accounting spreadsheet
7 to set the estimate of -- or in the calculation of
8 the groundwater CBCU calculation.

9 The spreadsheets are then basically the
10 calculations of computed water supply, virgin water
11 supply and allocations that are used to determine
12 compliance with the compact.

13 Q Could you describe the model runs that
14 are used for compact accounting purposes?

15 A The Final Settlement Stipulation,
16 Appendix C, spells out that there should be five
17 model simulations. One simulation is referred to as
18 the base case, or I like to call it the historical
19 case, which represents the conditions that actually
20 occurred.

21 Then there are --

22 Q Excuse me, let me just interrupt.
23 By "conditions that actually
24 occurred," can you tell me what that is?

25 A In the model it is representative of the

1 actions that have -- has occurred in the timeframe
2 addressed by the model.

3 Q And by "actions," what do you mean?

4 A Well pumping did occur, the surface
5 water imports did occur.

6 Q Okay.

7 A Then there are three simulations that
8 are referred to as the No State Pumping simulations
9 and each of those simulations, well pumping within a
10 particular state is switched off. And the fifth run
11 is a simulation where what is referred to as the
12 mound area, surface water returns flows from imported
13 water is switched off.

14 In -- yeah, that was the question,
15 wasn't it?

16 Q Yes.

17 A What the runs were?

18 Q Yes. Do you have the report you
19 prepared in this matter entitled "Estimating Computed
20 Beneficial Consumptive Use for Groundwater and
21 Imported Water Supply under the Republican River
22 Compact," Ahfed [sic], et al., a Report in Response
23 to?

24 A You are talking about my report, right?

25 Q Yes, your report.

1 A Yes, I do.

2 MR. BLANKENAU: Can we go off the record
3 for just a moment.

4 (Discussion off the record.)

5 Q (BY MR. BLANKENAU) Dr. Schreuder, I
6 would turn your attention, then, to your report at
7 page 1, third paragraph -- let me see if I'm in the
8 right spot here.

9 Yes. The third paragraph you indicate
10 that it is incorrect that there is a single problem
11 to be solved here.

12 What other problems exist within the
13 model or the accounting?

14 A The Ahlfeld, et al., report identifies
15 what it calls a "problem." In effect, what was
16 observed is the result of several different
17 mechanisms, not all of which are necessarily a
18 problem in the sense of an error.

19 So the first sentence in paragraph 3
20 simply restates the terminology of the Ahlfeld
21 report, adds to that that the conclusions are
22 incorrect and does not endorse the view that there is
23 a problem.

24 Q Are there errors? Is there more than a
25 single error?

1 A Well, I'm not sure that I am willing to
2 agree that there is a single error in the model.

3 Q Well, what are the other errors?

4 A I'm sorry --

5 Q I'm sorry, I understood you to say that
6 you would not agree that there is a single error with
7 the model, which implies there is more than one.

8 What would be the other errors?

9 A No, I'm not even agreeing to the fact
10 that is a single error. There may be no errors or
11 problems at all.

12 Q Okay. So your report where you state
13 "as if there is a single problem and a single
14 solution," and you state, "This is incorrect," would
15 be incorrect?

16 A The fact that the Ahlfeld report says
17 that there is a problem and a solution is incorrect.

18 Q Also on page 1, if I can find it, in the
19 numbered paragraph number 1 --

20 A Uh-huh.

21 Q -- you say that the magnitude of this
22 deficiency is overstated.

23 Are you saying that a -- that the
24 deficiency Nebraska complains of is so small it's not
25 worthy of correction?

1 A I would say that the magnitude of the
2 difference that was used as a demonstration of a need
3 is no larger than it was at the time that the three
4 states agreed to the current procedure.

5 Q Were you aware of the deficiency that
6 Nebraska complains of at the time this procedure was
7 adopted by the three states?

8 A I have a little bit of a problem with
9 describing it as a deficiency.

10 Q I think that is what your report calls
11 it.

12 A It may well be. It's simply a
13 difference; but the three states were aware that the
14 procedure, as agreed to, would not some identically
15 to the total computed impact as proposed or as set as
16 the goal in the Nebraska report, the Ahlfeld report.

17 Q And the states understood that at the
18 sub-basin level?

19 A Yes, I believe so.

20 Q With whom from Nebraska did you believe
21 -- strike that.

22 Who working for Nebraska had that
23 understanding?

24 A I'm a little nervous at answering that
25 question due to the confidentiality agreement that we

1 have; but since you are working for Nebraska, I
2 presume it's within your prerogative to ask the
3 question.

4 MR. AMPE: Yes.

5 A I'm struggling to give you a specific
6 name because I don't have a clear recollection of the
7 exact discussion that took place and who said what.

8 Q (BY MR. BLANKENAU) But you do recall
9 that the problem of which Nebraska complains of in
10 the Ahlfeld report was discussed among the three
11 states at that time?

12 A I think so, yes.

13 Q Who from Nebraska would have had that
14 discussion?

15 A The people that were on the committee.

16 Q So Mike McDonald?

17 A Perhaps. Lee Wilson. Those would be
18 the two likely candidates.

19 Q Is there any documentation of that
20 discussion?

21 A I don't remember if that was ever
22 memorialized anywhere or not. I just don't have any
23 recollection of any specific document to address that
24 specific issue.

25 Q It's a relatively complex issue, is it

1 not?

2 A In what sense?

3 Q Well, to, number one, discover it, you
4 have to do a lot of model runs to discover it, would
5 you not?

6 A No.

7 Q How did you discover it?

8 A It's such a fundamental thing in
9 modeling; it's not something that you discover, you
10 just know it is so.

11 Q The way it's handled in the accounting
12 process?

13 A Yes.

14 Q Let me take you to what you call an
15 important requirement at page 3 of your report, just
16 highlighted language. Would you read that for us out
17 loud.

18 A The one that starts "The pumping impacts
19 assigned to the State cannot seek them out" --

20 Q Yes.

21 A The highlighted paragraph, or the
22 highlighted sentence reads, "The pumping impacts
23 assigned to the State cannot exceed the amount of
24 additional baseflow that will be generated by
25 curtailment of all the wells in that State."

1 Q And you call that an important
2 requirement. Where is that requirement found?

3 A Are you asking where is it written down
4 in that particular phraseology?

5 Q Yes. You stated it is an important
6 requirement. I'm not aware that that requirement
7 exists within the compact itself and I'm curious
8 where it was required.

9 A I don't believe that it is specifically
10 spelled out in that sense in the compact.

11 Q Then where is the requirement?

12 A It's simple logic. If a state cannot be
13 in compliance with a compact in the essence -- in the
14 absence of a particular action, then the compact
15 prohibits that action. And since this applies to the
16 development of groundwater resources, failure to
17 satisfy that requirement would mean that the compact
18 prohibits the development of that resource, which
19 logically makes no sense.

20 Q Perhaps I'm not understanding what you
21 mean by your "requirement."

22 Can you explain that?

23 A If the way that a state is burdened
24 under the compact for a certain action exceeds the
25 benefit that could be derived by cessation of that

1 action, then there is a fundamental problem with how
2 that particular action is evaluated in a quantitative
3 sense.

4 Q Let me put this back to you in more lay
5 terms.

6 When I first read that sentence, I had a
7 certain understanding and I want to relate that
8 understanding to you and you can tell me whether I
9 understood what you were meaning or not.

10 Are you saying that a reduction in
11 baseflow that is calculated by the model cannot be
12 greater than the -- strike that. I am getting lost
13 in my own question.

14 I want to phrase this back to you, but
15 give me a moment to think about how I want to state
16 it.

17 Are you simply saying that a state
18 cannot be held responsible for baseflow reductions
19 than would, in fact, exist if there had been no wells
20 pumping at all?

21 A No.

22 Q Can you try to explain it to me again.

23 A I'm saying the exact opposite.

24 Q Okay.

25 A The state -- if you shut off the wells,

1 the state cannot be held responsible for more than
2 the -- the additional amount of baseflow that would
3 have occurred when the wells are shut off.

4 Q Can a state be held accountable for less
5 than would have occurred, had the wells been shut
6 off?

7 A I think what I'm saying is that what --
8 it is the intent that the state should be burdened
9 with an amount equal to that would -- that increase
10 in baseflow that would occur if the wells are shut
11 off.

12 Q As calculated by the model?

13 A The model is, at this time, the only way
14 we have for quantifying that, yes.

15 Q Explain to me what you believe
16 Nebraska's concern is with regard to the Ahlfeld
17 report.

18 A There are a number of different issues
19 raised in the report and it isn't spelled out real
20 clear exactly what the concern is.

21 I believe that, if I had to paraphrase
22 it, it is presented as that the approved procedure
23 underestimates the virgin water supply and,
24 therefore, underestimates the allocation that is made
25 to the states.

1 However, there are a number of other
2 asides that are mentioned, such as, for example, the
3 imported water supply calculation.

4 Q You provided an independent solution to
5 the Nebraska problem, did you not?

6 A I will not characterize it as such. I
7 simply provided a demonstration of -- that I would
8 say is an amplification of one of the issues
9 mentioned in the Nebraska report.

10 Q And you believe it addresses correctly
11 the Nebraska issues?

12 A It certainly tries to address some of
13 the issues that are mentioned.

14 MR. BLANKENAU: Why don't we take a
15 brief break, if that is okay.

16 MR. AMPE: Sure.

17 (Break was taken.)

18 Q (BY MR. BLANKENAU) Dr. Schreuder,
19 turning again to your report at page 21, you
20 complain that Nebraska, in illustrating its problem,
21 used a year of extreme drought.

22 Why is a year of extreme drought
23 objectionable?

24 A Well, in the first place, I wouldn't
25 phrase it as a complaint. I'm simply pointing it

1 out.

2 Just because this year was a very dry
3 year, it's a remarkable coincidence that that is the
4 year that Nebraska uses in all of its examples
5 because we would hope that it isn't a typical year of
6 what occurs in the future.

7 Q Is not dry-year accounting the most
8 critical aspect of the compact's functioning?

9 A I -- I don't know that it is.

10 Q So you would say that accurate
11 accounting is as important for state compliance in a
12 wet year as a dry year?

13 A As a general matter, yes.

14 Q You indicated before our break that you
15 believe that the problem that Nebraska now complains
16 of was understood when the states agreed to the Final
17 Settlement; is that correct?

18 A Yes.

19 Q What other problems were discussed with
20 either the accounting or the model that you are aware
21 of that were carried over and accepted?

22 A I have difficulty with your question in
23 the sense that you say what "problems," so there is
24 an implication there that there was something wrong
25 but we adopted it anyway.

1 So I'm not sure how to answer the
2 question because --

3 Q Let me change to a different question,
4 then.

5 A Are you saying that there are no
6 problems with the model and that it does, in fact,
7 accurately account for CBCU?

8 A I certainly think it's a reasonable
9 representation -- or reasonable estimate of the
10 quantities required.

11 Q And you believe that the accounting
12 procedures, then, are also a reasonable estimate?

13 A Are you trying to distinguish between
14 the estimates made by the model and accounting
15 somehow differently?

16 Q Yes, I am.

17 A I couldn't quite --

18 Q Yes.

19 A Sorry, I have forgotten the question.

20 Q Are you saying, then, that the
21 accounting process is without any problems?

22 A Again, I'm struggling with "problem."
23 The accounting procedures are whatever they are
24 because it was agreed to by the states as a
25 reasonable estimate of what is required under the

1 compact.

2 Q So, in your view, then, the accuracy of
3 the accounting is really irrelevant so long as the
4 states agree to it?

5 A I believe that if a demonstration could
6 be made that there was something in the accounting
7 procedures that is an outright error, that it would
8 be corrected; but, to my knowledge, no such
9 demonstration has been made.

10 Q What would be the magnitude of an
11 outright error that you believe would require
12 changing the accounting?

13 A I don't know that there is a requirement
14 that the error should be of a certain magnitude in
15 order to require a change to be made.

16 Q So if it were 10 acre-feet -- an error
17 of 10 acre-feet, would that be adequate to change the
18 accounting?

19 A Again, I don't know that the magnitude
20 of the error is necessarily the determining factor
21 whether the RRCA would decide to make a change or
22 not.

23 Q So, in your view, the size of the error
24 is irrelevant to whether a change should be made; is
25 that correct?

1 A I don't think that it's irrelevant; it's
2 -- I would say that it's not "the" determining
3 factor.

4 Q What would be "the" determining factor?

5 A I don't know that there is a single
6 determining factor.

7 Q Give me a couple of them.

8 A I guess that would be under the
9 discretion of the RRCA and I don't know that I can
10 enumerate all of the factors that would go into
11 making such a decision.

12 Q Can you enumerate any of them?

13 A Well, certainly, I would think that it
14 would comprise of whether the procedure, as
15 implemented, in fact, agrees with what the three
16 states agree to; and, if in the implementation of
17 that procedure, there is a deviation from what is
18 prescribed, that would certainly be a factor to
19 consider.

20 In the case of the model update from
21 version 12P to 12S, it was demonstrated that there
22 was, in fact, a mistake in the way that the stream
23 package was implemented.

24 So that would be an example of where the
25 physical reality on the ground differed from the

1 implementation.

2 Q Did that change benefit one state over
3 another?

4 A I don't recall.

5 Q Is it your understanding that the
6 accounting procedure is designed to accurately
7 account for the water of the basin?

8 A Again, "accurately" is a loaded word,
9 but I would certainly agree that it is the goal of
10 the accounting procedure to account for the water in
11 the basin as accurately as can be.

12 Q And just so you are clear, you have
13 referred to "accurately" as a loaded word on several
14 -- twice, now. Can you explain what you mean by
15 that?

16 A It is the implication of the word
17 "accurately" that there is a quantity that can be
18 known with mathematical precision. And the
19 difficulty in this particular application is that we
20 can only estimate what those quantities are with the
21 best available technology; the true answer is
22 unknowable.

23 Q Earlier you testified that there were
24 errors within the model's computations -- and by
25 "errors," I mean a range of errors, a deviation from

1 what, in fact, you could know to mathematical
2 certainty and what the model actually calculates.

3 Do you have a sense for, again, the
4 range of errors?

5 A I'm struggling with what specifically
6 you are referring to.

7 Q Let me try to give you an example,
8 perhaps.

9 Say the model calculates stream flow
10 depletions to be 100 cfs, for 100 acre-feet. Is that
11 accurate to within 5 percent, 10 percent, 20 percent
12 of reality, or do we have a sense at all?

13 A I don't know that I have a quantitative
14 answer to that question in the sense that I can give
15 you a percentage error in any -- in all of the
16 predictions of the model runs.

17 Q Would the proposed solution by Nebraska,
18 as explained in the Ahlfeld report, increase or
19 decrease the magnitude of any error that exists?

20 A As a general matter, I would think that
21 it tends to increase the uncertainty, or error, if
22 you wish, in the model predicted results.

23 Q Why would that be?

24 A Because the application of the model
25 that is required for the method proposed in the

1 Ahlfeld report is further removed from the conditions
2 to which the model was calibrated and is required by
3 the current procedure.

4 Q Doesn't it use the same conditions?

5 A No, it does not.

6 Q How does it differ?

7 A The procedure in the Ahlfeld report
8 gives what is, in effect, equal weight to a
9 perturbation of the historical condition and a
10 perturbation of the predevelopment condition.

11 And by "predevelopment condition," I
12 mean the application of the model over all time as if
13 no well development or surface water imports have
14 ever occurred.

15 Q Doesn't that -- isn't that part of one
16 of the existing model runs -- the all-off scenario?

17 A No.

18 Q Explain the all-off scenario to me, if
19 you would.

20 A In the Ahlfeld report, one of the
21 differences used is a scenario where it is assumed
22 that no well development has ever occurred
23 historically, nor was there surface water imports.
24 And it concludes a difference between that scenario
25 and a scenario where the development either of wells

1 or surface water imports occurred in only one state.

2 Q Explain to me, then, how the existing
3 model runs occur.

4 A The currently approved procedure states
5 that the model should be run under conditions that
6 have historically observed -- and we talked about
7 that earlier, what that means -- and a simulation
8 where it is assumed that well development or surface
9 water imports in only one state did not occur.

10 Q I'm having difficulty seeing the
11 distinction that you are making in the historical
12 calibration between the way the model is presently
13 run and that suggested by Ahlfeld.

14 A Is that a question?

15 Q It is. It isn't. It was intended to
16 be, but it isn't.

17 Can you explain further the distinction
18 between how the model calculations presently occur
19 and that proposed by Ahlfeld and why, then -- a
20 two-part question -- why, then, the Ahlfeld would not
21 result in greater accuracy?

22 A The currently approved procedure is a
23 perturbation from a known condition. The Ahlfeld
24 report requires a perturbation from an unknown
25 condition.

1 Q Don't we now turn off all the states in
2 the mound, in the current procedures?

3 A No.

4 Q We don't, on any of those runs?

5 A We turn them off one at a time.

6 Q Then what is the base condition that we
7 utilize?

8 A Historical conditions.

9 Q And at no time do we turn them all off?

10 A Not in the procedure as it is currently
11 outlined.

12 Q Was the model calibrated to
13 predevelopment conditions?

14 A No.

15 Q Was it calibrated -- let me strike that.

16 Do you know how many wells there are in
17 Colorado in the Frenchman Creek basin, approximately?

18 A I don't think I have ever tried to make
19 that calculation.

20 Q Do you know how many acres are irrigated
21 in that basin?

22 A I don't believe I have ever made that
23 calculation.

24 Q Do you know how much water is pumped in
25 that basin?

1 A I don't believe I have ever made that
2 calculation.

3 MR. BLANKENAU: Could we break again?

4 MR. AMPE: Sure.

5 (Break was taken.)

6 Q (BY MR. BLANKENAU) Dr. Schreuder, I
7 just have a few more questions for you.

8 Did you run the model using the proposed
9 Nebraska solution in working through the accounting
10 to check any of it?

11 A Nebraska provided me with the model run,
12 so I did not need to rerun the model.

13 Q I have what I'm going to have marked as
14 an exhibit. I apologize it's all loose.

15 (Deposition Exhibit 1 was marked.)

16 Q (BY MR. BLANKENAU) Have you seen that
17 document before, Dr. Schreuder?

18 MR. AMPE: Can we go off the record and
19 make sure we all have the same pages in the same
20 order.

21 (Discussion off the record.)

22 Q (BY MR. BLANKENAU) Dr. Schreuder, have
23 you seen that document previously?

24 A It doesn't look familiar at all, no.

25 Q Okay. In preparing your responsive

1 report to the Ahlfeld report, did you discuss the
2 Nebraska solution with anyone from Kansas?

3 A Yes, I recall a number of discussions
4 with representatives of both Nebraska and Kansas.

5 Q Did you have any conversations with
6 Kansas alone, without anybody from Nebraska present?

7 A Most likely, yes.

8 Q Most likely, yes?

9 A Sorry. Sorry, I didn't mean to shake my
10 head.

11 Q So your answer was yes?

12 A I believe so, yes.

13 Q Do you recall any of those specific
14 discussions?

15 A Not in particular, any detail, no.

16 Q With whom would you have discussed?

17 A Steve Larson, Sam Perkins, David
18 Barfield, George Austin, I don't remember -- probably
19 Dale Book, but I don't recall.

20 MR. BLANKENAU: Okay, I don't think we
21 have anything further.

22 MR. AMPE: Why don't we take a quick
23 break and come back.

24 (Break was taken.)

25 MR. AMPE: Let's go back on the record,

1 I don't have much.

2 EXAMINATION

3 BY MR. AMPE:

4 Q So, Doctor, is it possible to measure
5 the impact of wells upon stream flows to verify the
6 application of the model?

7 A No. That's why we need the model in the
8 first place. If we could measure it, we would use
9 the measurements instead.

10 Q And amongst your many degrees, do you
11 happen to possess a juris doctor?

12 A Sadly, no.

13 MR. AMPE: Let the record show the
14 sarcasm involved in that response.

15 Q (BY MR. AMPE) So, Doctor, would it be
16 fair to say in your discussions with counsel
17 regarding interpretation of the compact, that you
18 were speaking as a modeler and what you understood
19 as a modeler was required, rather than an
20 independent expert opinion?

21 A That is correct.

22 MR. AMPE: No further questions.

23 MR. SPEED: Kansas has no questions.

24 MR. BLANKENAU: I don't think we have
25 anything.

1 MR. AMPE: Okay, great. Thank you.
2 (WHEREUPON, the deposition concluded at
3 10:53 a.m.)
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1 I, WILLEM SCHREUDER, do hereby certify
2 that I have read the foregoing transcript and that
3 the same and accompanying correction sheets, if any,
4 constitute a true and complete record of my
5 testimony.

6
7
8
9 _____
Deponent

10 () No changes

() Amendments attached

11
12 Subscribed and sworn to before me this
13 _____ day of _____,
14 2009.

15 My commission expires _____

16
17 _____
Notary Public

18
19 cp

20 REPUBLIC RIVER COMPACT ADMINISTRATION
21
22
23
24
25

1 STATE OF COLORADO)
2) ss. REPORTER'S CERTIFICATE
3 COUNTY OF DENVER)

4 I, Carol Patterson, do hereby certify
5 that I am a Registered Merit Reporter and
6 Notary Public within the state of Colorado; that
7 previous to the commencement of the examination,
8 the deponent was duly sworn by me to testify to the
9 truth.

10 I further certify that this deposition was
11 taken in shorthand by me at the time and place
12 herein set forth and was thereafter reduced to
13 typewritten form, and that the foregoing constitutes
14 a true and correct transcript.

15 I further certify that I am not related to,
16 employed by, nor of counsel for any of the parties
17 or attorneys herein, nor otherwise interested in the
18 result of the within action.

19 In witness whereof, I have affixed my
20 signature this 3rd day of March, 2009.
21

22 PATTERSON REPORTING & VIDEO
23 Carol Patterson
24 Registered Merit Reporter
25 and Notary Public

PATTERSON REPORTING & VIDEO, INC.
Highpoint
2170 South Parker Road, Suite 263
Denver, Colorado 80231

March 3, 2009

PETER J. AMPE, ESQ.
Office of the Attorney General
First Assistant Attorney General
1525 Sherman Street, 7th Floor
Denver, Colorado 80203

Caption: REPUBLIC RIVER COMPACT ADMINISTRATION
Case No.: Supreme Court 126
DEPOSITION OF: WILLEM SCHREUDER

Dear Mr. Ampe:

The deposition in the above-entitled matter is ready
for reading and signing. Please attend to this
matter by complying with ALL blanks checked below.

XX arranging with us at (303) 696-7680 to read.
and sign the deposition in our office.

OR (if applicable),

XX have deponent read your copy; signing attached
original signature page and any amendments
sheets.

_____ read enclosed deposition, sign attached
signature page and any amendment sheets.

XX by March 6, 2009, due to trial date of 3/9/09

Please be sure that the signature page and
accompanying amendment sheets, if any, are signed
before a notary public and returned to our office at
the above address.

If this matter has not been taken care of within said
period of time, the deposition will be filed unsigned
pursuant to the Rules of Civil Procedure.

Thank you.

Enclosures: Don Blankenau, Esq.; Samuel Speed, Esq.

Page 43

PATTERSON REPORTING & VIDEO
Highpoint
2170 South Parker Road, Suite 263
Denver, Colorado 80231

March 3, 2009

Don Blankenau, Esq.
Husch Blackwell Sanders LLP
206 South 13th Street, Suite 1400
Lincoln, Nebraska 68508

Caption: REPUBLIC RIVER COMPACT ADMINISTRATION

Case No.: Supreme Court 126

Enclosed is the deposition of: WILLEM SCHREUDER

____ Previously filed. Forwarding signature page and
amendment sheet(s).

____ Signed, no changes.

____ Signed, with changes, copy of which is enclosed.

____ No signature required.

____ Signature waived.

XX Forwarding original transcript unsigned;
signature page and/or amendments will be
forwarded if received.

____ Original exhibits included in ongoing notebook
and will be filed with counsel at conclusion of
discovery.

Enclosures: (As above noted)

cc: Peter J. Ampe, Esq; Samuel Speed, Esq.